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A Catrionid, *Catriona beta* n. sp., with a Radula of *Cuthona* Type (Nudibranchia-Eolidoidea)

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Attempts have been set forth by various authors (ODHNER, 1939, p. 53; MACNAE, 1954a, pp. 3-4, 1954b, pp. 52-53; MARCUS, 1959, pp. 917-918) to distinguish generically *Catriona* WINCKWORTH, 1941 (=*Cratena* in older use) from *Cuthona* ALDER & HANCOCK, 1855. The summary of the present knowledge of ours concerning the main distinctions between the two genera may be tabulated as follows :

Cuthona……Radula teeth with a projecting median cusp; penis unarmed.

Catriona……Radula teeth with a median cusp retracted or similar to lateral denticles in length; penis armed with an apical stylet.

It is to be noted, however, that the type species of *Cuthona* (*nana* A. & H., 1842, Atlantic) and *Catriona* (*aurantia* A. & H., 1842, Atlantic) are still left more or less uncertain in their penis diagnosis.

The aim of this paper is to call attention to the occurrence of a mosaic species[1] which has the decided radula[2] type of *Cuthona* (cf. the radula teeth of *nana* A. & H.) on one hand, and the presumed penis[3] peculiarity of *Catriona* (cf. the penis stylet of *coerulea* MONTAGU, 1804, Atlantic and Mediterranean, by MARCUS, 1955, p. 175, pl. 26, fig. 243, Brazil). Here a tentative reference of our species is made to *Catriona* following to MARCUS, 1959, p. 917.

The holotype specimen of the new species was obtained from the vicinity of the Noto Marine Laboratory of the Kanazawa University, and we express here our sincere thanks to Dr. Masao KUMANO, Professor of the said University, who generously given us facilities for collecting and studying rich opisthobranch fauna at the Laboratory during the years 1960 and 1962. One of the paratype specimens was sent to us by the courtesy of Dr. Yoshiharu HONMA of the Niigata University.

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1) Another problematical species was found by the senior author and Mr. Iwao HAMATANI : it showed the *Catriona* teeth and the *Cuthona* penis. The report has appeared in the Publications of the Seto Marine Biological Laboratory, 11 (2).

2, 3) See the suggestions made by RISSO-DOMINGUEZ, 1962, pp. 145-152, on the systematic meaning of the radula teeth and penis armatures in the classification of the Facelinacea.

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Catriona beta BABA & ABE, n. sp.
Tsukumo-minoumiushi (n. n.)

This species is closely allied to *Cuthona osyoro* BABA, 1940, p. 108, fig. 8, from Osyoro, Hokkaido, northern Japan, in the general body-form, in the banded branchial papillae, and in the acutely pointed shape of the radula teeth. But in the latter species, the general body-colour is whitish, and the lateral denticles of each of the teeth number only 4-6. The penis character of *osyoro* was not determined.

Holotype : Matured, length 2 mm. (Code Ac) Both the cephalic tentacles and rhinophores rather short, the latter simple. Foot-corners rounded. Branchial papillae short fusiform, arranged in 7 simple oblique rows on each side, about 3 papillae in the largest rows, the foremost 3 rows belonging to the right liver (and the left-sided partner). Genital orifice below the 1st branchial row on the right side, the anus in front of the inner corner of the post-anal row, the nephroproct preanal. General body-colour pale purplish red, deeper towards the head and cephalic structures; branchial papillae with a deep purplish red band towards the end, their veins (=liver-diverticula) orange-yellow. Liver branching as usual in *Catriona* (and *Cuthona*), the blind-sac of stomach not determined. With simple salivary glands. With well-developed oral glands. Kidney a simply elongated canal. Jaw-edge (?). Radula formula (?). Teeth with a prominent median cusp (*Cuthona* type). Penis short conical, muscular, and provided with an apical stylet (*Catriona* type). A penis gland passing into the penis. About 11 testes, each accompanied by several ovaries.

Holotype locality : Vicinity of the Noto Marine Laboratory, Ogi, Toyama Bay, Japan Sea side of Japan, on the shore.
Date of collection : Aug. 7, 1960 (1 sp., coll. by the authors).

The holotype was prepared in serial horizontal sections.

Paratype 1 : Length 4 mm. General body-form and colours approximately as in the holotype. Branchial papillae in about 10 oblique rows on each side. Jaw-edge (?). Radula formula 30×0.1.0; each tooth with a protruded and strong median cusp and 10-15 lateral denticles.

Paratype 1 locality : On the shore of Kannonzaki, Toyama Bay.
Date of collection : July 25, 1953 (1 sp., coll. by the authors).

Paratype 2 : Length 6 mm. General body-form and colours materially as in the holotype.

Paratype 2 locality : Suizu-Okazaki, Tsuruga Bay, Japan Sea side of Japan.
Date of collection : July 28, 1955 (1 sp., coll. by the junior author).

Paratype 3 : Length 5 mm. General body-form and coloration nearly as in the holotype. Branchial papillae in 10 oblique rows, the largest rows containing 4-5 papillae. Jaw-edge feeble and with a row of several denticles. Radula formula 38×0. 1. 0. Each tooth with a protruded and strong median cusp, and 8-9 lateral denticles.

Paratype 3 locality : Vicinity of the Sado Marine Biological Station, Sado I., Japan Sea side of Japan.
Date of collection : Aug. 1, 1956 (1 sp., coll. by Dr. HONMA).

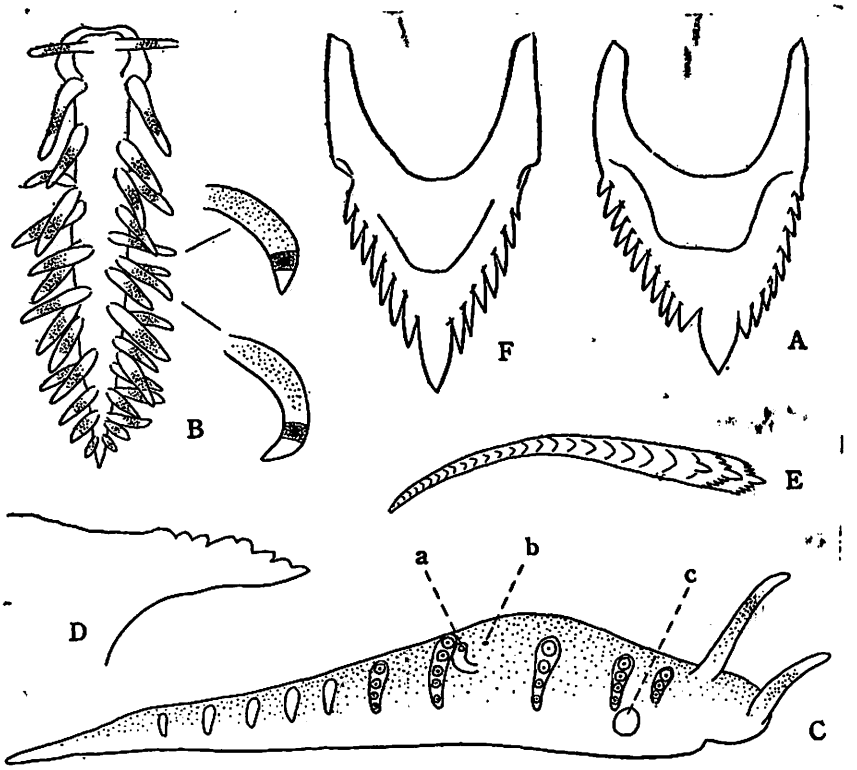

Fig. 1. *Catriona beta*, paratypes. A. Paratype 1. Kannonzaki, Toyama Bay (July 25, 1953). A radula tooth (×520). B-F. Paratype 3. Sado I. (Aug. 1, 1956) : B. Entire animal in life (a sketch taken by Dr. HONMA), length 5 mm; C. Right side view of the preserved animal, a. anus, b. nephroproct, c. genital orifice; D. A jaw-edge (×520); E. A radula ribbon; F. A radula tooth (×520).

Synopsis of the family Cuthonidae

A tentative synopsis of the genera of the family Cuthonidae is here prepared, partly as a result of our actual dissection work on some of the cuthonid eolids collected from our seas, and partly as a summary of the bibliographical records referred to during this study. As for the main principle of classification of this family, we adopted that of ODHNER, 1939.

Family Cuthonidae ODHNER, 1939

Acleioprocta with the anus (and preanal nephroproct) lying between the right liver and the left posterior liver branches (in the interhepatic space). Radula uniseriate (0. 1. 0) (ODHNER, 1939, pp. 52-53, shortened).

A. Cuthoninae (ODHNER, 1939)

Typical cuthonids. Branchial papillae in many oblique rows (ODHNER, 1939, p. 52). Usually having more than 3 canals in the right liver (and the left-sided partner). Some aberrant forms each with a reduced liver system (and hence simplified papillation) may

occur within the scope of this subfamily. Genera : *Cuthona*[1] A. & H., 1855; *Catriona*[2] Winckworth, 1941 (=*Trinchesia* Pruvot-Fol, 1951); *Subcuthona* Baba, 1949 (aberrant); *Tenellia*[3] A. Costa, 1866 (aberrant).

Further accounts of the internal anatomy are to be expected for the genera : *Precuthona* Odhner, 1929; *Cuthonella* Bergh, 1884; *Cratenopsis* Lemche, 1935; *Indocratena* Odhner, 1940; *Xenocratena* Odhner, 1940; *Diaphoreolis* Iredale & O'Donoghue, 1923; *Noumeaella* Risbec, 1937; *Globiferina* Risbec, 1937; *Ennoia* Bergh, 1896; *Narraeolidia* Burn, 1961 (?=*Cuthona*); *Dunga* Eliot, 1902; *Zatteria* Eliot, 1902; *Njurja* Marcus, 1959; *Phestilla* Bergh, 1874; and *Guyvalvoria* Vayssière, 1906.

B. Tergipedinae Odhner, 1939

Liver system extremely simplified with only 1 canal in the right liver (and the left-sided partner) (Odhner, 1939, p. 75; Pruvot-Fol, 1954, p. 378; slightly altered). Genera: *Tergipes* Cuvier, 1805; ?*Piseinotecus* Marcus, 1955; ?*Myja* Bergh, 1896.

C. ? Embletoninae Pruvot-Fol, 1954.

Head with paired oral lobes. Having 2 canals in the right liver (and the left-sided partner); a single branchial papilla to each liver canal. Genus : *Embletonia*[4] A. & H., 1851.

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1, 2) Neglecting some minor differences found in connection with the radula teeth and penis armature, the genera *Cuthona* and *Catriona* agree with each other quite well in the general organization both external and internal. They may finally be collected into a single morphological group.

3) A short account of *Tenellia pallida* from Japan has appeared in the Publications of the Seto Marine Biological Laboratory, **11** (2).

4) The species *Embletonia gracilis* Risbec, 1928 has been discussed in a separate paper in the Publications of the Seto Marine Biological Laboratory, **11** (2).

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要　　約

金沢大学付属能登臨海実験所の周辺には甚だ多数の後鰓類の種を産することが，われわれの過去数次にわたる採集結果から明らかとなった。しかもそれらの種は普通種であっても，分類学的に見て再検討を要する事項を数多く包蔵し，貴重な研究資料であることには変わりはない。別に新種若干種が含まれる。本文には，ミノウミウシ類の二つの属 *Cuthona*・*Catriona* のそれぞれの特長を，半分ずつ混合したような1事例として，新種ツクモミノウミウシ *Catriona beta* に関する記載を行なった。

われわれは種や属の類別に用いる特長は簡明であるように心がける。しかし分類はこのような簡単な基準で機械的に行われるものでないことを，付言したい。ミノウミウシ類の示す種々な色彩は，体表上皮に含まれる色素によるほか，肝臓（中腸腺）上皮の生理的性状その他に依存することもあるから，色彩発現の機序を明らかにした上でなければ，本当には本類の体色は理解されないのである。また例えば内臓諸器官についても，各種・属ごとに器官の構造と機能とを一いわゆる functional morphology の立場から一追求するのでなければ，それぞれの器官の正当な名称は定められない。しかもこれらのことは，言うべくして容易ではないのである。

ツクモミノウミウシの和名は，能登臨海実験所の所在地，小木九十九湾からとった。本種は体長2mmにして既に成熟せる微小種で，本体部背面は美しい淡紫赤色，各鰓突起先端には濃い紫赤色輪帯がある。内部的には本種の歯舌の各歯は明瞭に *Cuthona* 属の特色を有するが，陰茎先端にキチン質の1個の短棘を帯びることから，本種は暫定的に *Catriona* 属に編入される。本種の既採集地は敦賀湾・富山湾および佐渡で，沿岸帯に産する。

Plate I

Explanation of figures

Figs. 1-7. *Catriona beta* from Ogi, Toyama Bay (Aug. 7, 1960), holotype.

Fig. 1. Entire animal in life (length 2 mm).

Fig. 2. A radula tooth in the serial horizontal sections (×270).

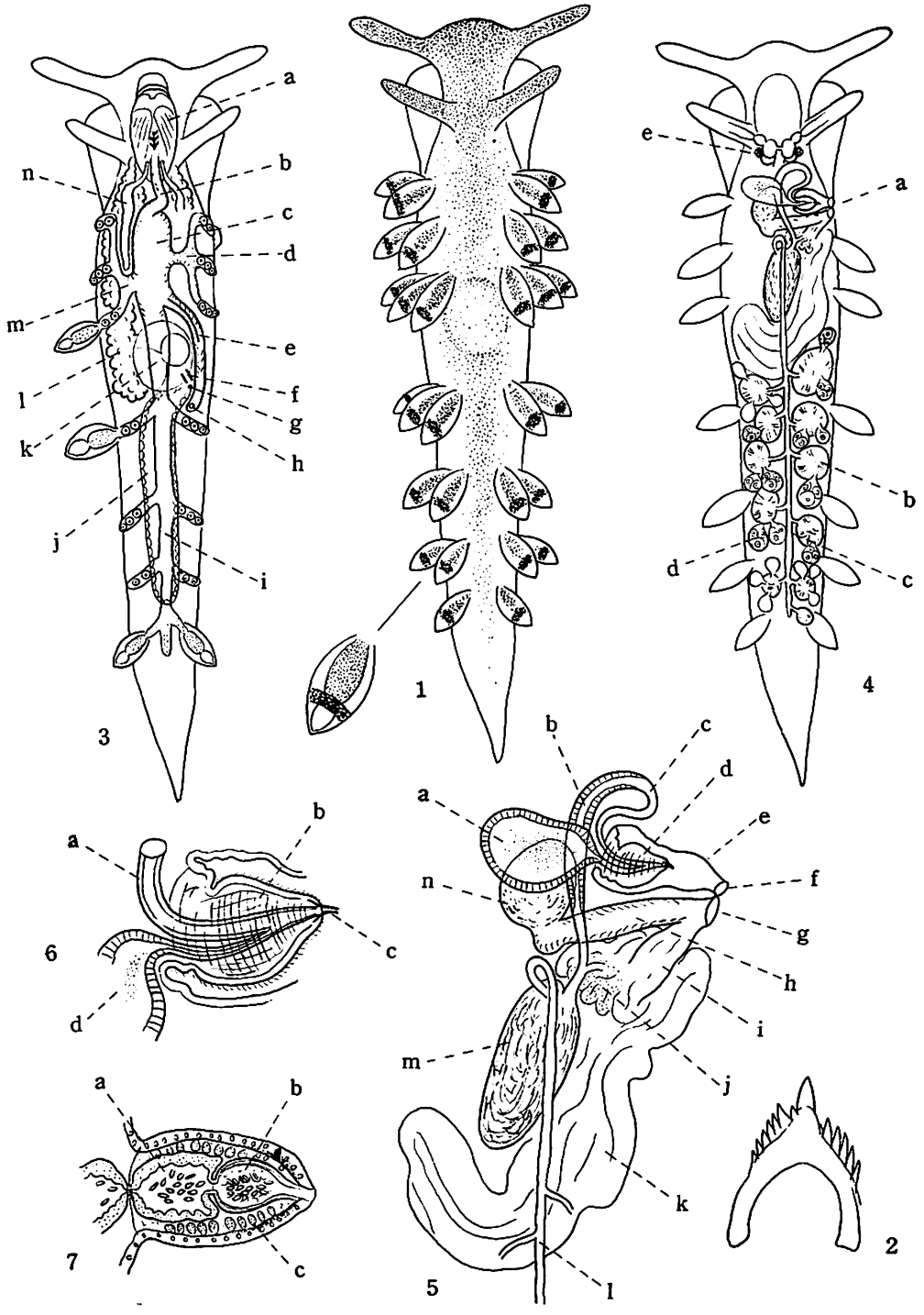
Fig. 3. Digestive system in the body, diagrammatic. a. pharynx, b. oesophagus, c. stomach, d. right liver, e. intestine, f. reno-pericardial canal, g. nephroproct, h. anus, i. left posterior liver, j. kidney, k. auricle and ventricle, l. oral gland, m. left anterior liver, n. salivary gland.

Fig. 4. Genital system in the body, diagrammatic. a. genital orifices, b. testes, c. hermaphrodite duct, d. ovaries, e. central nervous system (cerebro-pleural ganglia and pedal ganglia).

Fig. 5. Genital organs from above, diagrammatic. a. penis gland, b. prostatic part of vas deferens, c. muscular part of vas deferens, d. penis, e. penis sheath, f. male orifice, g. female orifice, h. vagina, i. outer oviduct, j. albumen gland, k. mucous gland, l. hermaphrodite duct, m. ampulla, n. spermatheca.

Fig. 6. Part of the male genital organs (×100). a. muscular part of vas deferens, b. penis, c. penis stylet, d. penis gland.

Fig. 7. Branchial papilla with an artificial cnidopore (×60). a. liver-diverticulum, b. cnidosac, c. special cells.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